

Demonstration of Fixatives to Control Contamination and Accelerate Deactivation and Decommissioning (D&D)

Challenge

The 2000 Complex at the Oak Ridge National Laboratory (ORNL) has been identified as a high risk facility. The 50-year-old series of connected metal buildings has deteriorated to the point that it has been condemned and is unsafe for routine human entry. Additionally, the polychlorinated biphenyl (PCB) and lead-containing paint which is flaking off the exterior of the rusting metal building is the single largest source of PCB contamination to the ORNL storm water system. This flaking paint will also present a serious hazard to human health and the environment during D&D when the paint could become pulverized and airborne. These airborne particles, if not properly controlled, could become an exposure hazard for the D&D workers, co-located site workers, adjacent soil and surface water, and the privately funded buildings adjacent to the 2000 Complex along Bethel Valley Road. The method most often used for dust suppression during D&D is a water spray. Unfortunately if used, this water spray could allow the PCB-contaminated water to enter the storm water drains or contaminate down-hill soils and privately-owned buildings even with proper diking.

Technical Solution

The recommended solution to address this issue is to coat the building with a fixative or sealant that will prevent the paint from flaking off prior to and during D&D and prevent further rain intrusion into the building. Available cost and performance data was used to identify the most promising commercially-available fixative products that could meet the following requirements:

- able to adhere to a dusty, weathered, rusting, metal surface with flaking paint with no surface cleaning or preparation
- able to keep lead/PCB-containing paint from flaking off prior to and during D&D
- able to fix radioactive contamination
- able to seal small holes in the exterior applied through spray-on application without removing flaking paint
- be applied in hot, humid weather conditions
- be weather resistant – freeze/thaw, rain, hail, 100°F, high humidity
- be non-toxic/non-carcinogenic – to workers and environment during and after application;
- meet Land Disposal Restrictions and/or on-site disposal criteria
- be non-leaching, non-flammable
- will not present additional problems during demolition



The fixatives chosen for demonstration were:

- Bartlett – Polymeric Barrier System (PBS)
- Global Encasement – Prepless Primer™ and Your Last Coat™

Site Project & Identifier

D&D Toolbox – ORNL Fixatives Demonstration

Tech Stage:

Demonstration

Demonstration of fixatives on the ORNL 2000 Complex

Tech Accomplishments

The Bartlett and Global Encasement fixatives met the established criteria for the demonstration. The PBS was applied at about a 25-mil thickness and produced a tough, flexible coating. The flaking paint did not re-adhere to the surface, but was encapsulated sufficiently so as to be very difficult to pull off. Both the Prepless Primer™ and Your Last Coat™ were each applied at a 12-mil thickness and produced a hardened coating. The flaking paint did not re-adhere to the surface and could be physical stripped or broken, but still provided a more durable surface than before coating. After 6 months of weathering through the winter months, the Global Encasement products maintained their elasticity with few, if any, new paint chips breaking off. The Bartlett PBS became brittle with numerous paint chips falling off during the observation period.

Impact

Fixatives can be an effective means of containing contamination during activities such as surveillance and maintenance (S&M) and D&D while improving worker safety and protecting the environment. Fixatives also have the potential to reduce the cost and accelerate the schedule for D&D by reducing contamination control, monitoring, and personnel protection equipment requirements.

Impacts and Features

- Eliminate the largest known source of PCB-contamination to soil and surface water on the ORNL site
- Retard continued external deterioration of the 2000 Complex
- Reduce or eliminate rain water intrusion into the building
- Reduce or eliminate worker exposure to PCB-containing paint during S&M and D&D activities
- Accelerate the D&D schedule

Vendor/Provider Information:

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Tech Information Provider:

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Technology Name:

- Fixative
- Coating
- Sealant

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Challenge Category	Tech Solution Category
<ul style="list-style-type: none">• Contaminate Migration Control• Facility Stabilization• Deactivation	<ul style="list-style-type: none">• Surveillance & Maintenance• Dismantlement• Demolition• Fixatives, coatings, & encapsulation